

WHAT IS CLAIMED IS:

1       1. A method for locating signal path-rays in a  
2 communications system, comprising the steps of:  
3            receiving a signal;  
4            decimating said signal to produce a decimated  
5 signal;  
6            processing said decimated signal to produce at  
7 least one first location; and  
8            processing said signal and a generated code using  
9 said at least one first location to produce at least one  
10 second location.

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1           2. The method according to Claim 1, wherein:  
2                    said step of processing said decimated signal to  
3 produce at least one first location comprises the step of  
4 processing said decimated signal to produce said at least one  
5 first location having a first precision;

6                    said step of processing said signal and a generated  
7 code using said at least one first location to produce at  
8 least one second location comprises the step of processing  
9 said signal and said generated code using said at least one  
10 first location having said first precision to produce said  
11 at least one second location having a second precision; and  
12                    said first precision being less precise than said  
13 second precision.

1           3. The method according to Claim 1, further comprising  
2 the step of:

3                    sampling said signal in an analog-to-digital  
4 conversion a plurality of times per chip prior to said step  
5 of decimating; and

6                    wherein said signal in said step of decimating  
7 comprises the sampled signal.

1       4. The method according to Claim 1, wherein said  
2 communications system comprises a wireless Code Division  
3 Multiple Access (CDMA) communications system.

1       5. The method according to Claim 1, wherein said step  
2 of processing said decimated signal to produce at least one  
3 first location comprises the step of applying said decimated  
4 signal to at least one filter to produce said at least one  
5 first location.

1       6. The method according to Claim 5, wherein said step  
2 of applying said decimated signal to at least one filter to  
3 produce said at least one first location comprises the step  
4 of applying said decimated signal to at least one finite  
5 impulse response (FIR) filter of at least one matched filter.

1        7. The method according to Claim 5, wherein said step  
2        of processing said decimated signal to produce at least one  
3        first location further comprises the step of applying an  
4        output of said at least one filter to a peak detector to  
5        determine said at least one first location.

1        8. The method according to Claim 1, wherein said step  
2        of processing said signal and a generated code using said at  
3        least one first location to produce at least one second  
4        location comprises the step of shifting one of said signal  
5        and said generated code responsive to said at least one first  
6        location to create a shifted variable and a non-shifted  
7        variable.

1        9. The method according to Claim 8, wherein said step  
2        of processing said signal and a generated code using said at  
3        least one first location to produce at least one second  
4        location further comprises the step of correlating said  
5        shifted variable with said non-shifted variable to produce  
6        a plurality of correlation values.

1        10. The method according to Claim 9, wherein said step  
2        of processing said signal and a generated code using said at  
3        least one first location to produce at least one second  
4        location further comprises the step of comparing said  
5        plurality of correlation values to select said at least one  
6        second location.

1        11. The method according to Claim 9, wherein said  
2        shifted variable comprises said signal and said non-shifted  
3        variable comprises said generated code.

1        12. The method according to Claim 9, wherein said  
2        shifted variable comprises said generated code and said non-  
3        shifted variable comprises said signal.

1        13. The method according to Claim 1, further comprising  
2        the step of forwarding said at least one second location to  
3        rake fingers to enable subsequent maximal ratio combining  
4        (MRC) of said signal.

1        14. A receiver system for locating signal path-rays in  
2 a communications system, comprising:

3                a decimation part that decimates a signal in  
4 accordance with a decimation factor;

5                at least one filter connected to said decimation  
6 part, said at least one filter involved in determining a  
7 first location of said signal;

8                a code generator part, said code generator part  
9 adapted to generate at least one code pattern;

10                at least one shifter connected to said at least one  
11 filter to receive said first location; and

12                at least one correlator, said at least one  
13 correlator correlating a version of said signal to a version  
14 of said at least one code pattern.

1        15. The receiver system according to Claim 14, wherein  
2 said shifter shifts said signal, said version of said signal  
3 is a shifted version of said signal, and said version of said  
4 at least one code pattern is an un-shifted version of said  
5 at least one code pattern.

1        16. The receiver system according to Claim 14, wherein  
2        said shifter shifts said at least one code pattern, said  
3        version of said signal is an un-shifted version of said  
4        signal, and said version of said at least one code pattern  
5        is a shifted version of said at least one code pattern.

1        17. The receiver system according to Claim 14, further  
2        comprising an analog-to-digital converter, said analog-to-  
3        digital converter converting said signal to a digital,  
4        sampled signal prior to said decimation part decimating said  
5        signal.

1        18. The receiver system according to Claim 17, wherein  
2        a sampling rate of said analog-to-digital converter is such  
3        that an analog version of said signal is sampled a plurality  
4        of times per chip.

1        19. The receiver system according to Claim 18, wherein  
2        said sampling rate and said decimation factor are  
3        determinative, at least in part, of a precision of said first  
4        location.

1        20. The receiver system according to Claim 14, further  
2 comprising a peak detector; and

3                wherein said at least one filter comprises a  
4 plurality of matched filters, said plurality of matched  
5 filters include at least one finite impulse response (FIR)  
6 filter, an input of said peak detector is comprised of an  
7 output of said at least one FIR filter, and said first  
8 location is comprised of an output of said peak detector.

1        21. The receiver system according to Claim 14, wherein  
2 said at least one correlator comprises a plurality of  
3 correlators, each of said plurality of correlators including  
4 a multiplying mixer and an integrator.

1        22. The receiver system according to Claim 14, further  
2 comprising a comparison part; and

3                wherein said at least one correlator comprises a  
4        plurality of correlators, each of said plurality of  
5        correlators outputs a correlation value, said comparison part  
6        selects a highest value from among the output correlation  
7        values, and a second location output from said comparison  
8        part is comprised of said highest value or a related value.

1        23. The receiver system according to Claim 22, wherein  
2        a first precision of said first location is less exact than  
3        a second precision of said second location.

1        24. The receiver system according to Claim 14, wherein  
2        said communications system comprises a wireless Code Division  
3        Multiple Access (CDMA) communications system.

1        25. The receiver system according to Claim 14, further  
2        comprising a comparison part and a plurality of rake fingers,  
3        said comparison part receiving at least one output from said  
4        at least one correlator and providing a second location to  
5        at least one of said plurality of rake fingers.

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1        26. A method for searching for signal path-rays in a  
2        Code Division Multiple Access (CDMA) communications system,  
3        comprising the steps of:  
4                receiving a signal;  
5                determining a coarse location of said signal;  
6                determining a fine location of said signal based,  
7        at least in part, on said coarse location; and  
8                providing said fine location to rake fingers.

1        27. The method according to Claim 26, wherein said step  
2        of determining a coarse location of said signal comprises the  
3        step of decimating said signal, said signal having been  
4        oversampled.

1           28. The method according to Claim 26, wherein said step  
2       of determining a fine location of said signal based, at least  
3       in part, on said coarse location comprises the steps of:  
4           generating a code pattern;  
5           shifting responsive to said coarse location;  
6           correlating said code pattern to said signal, at  
7       least one of said code pattern and said signal having been  
8       shifted in said step of shifting; and  
9           selecting said fine location in response to said  
10      step of correlating.

1        29. A method for locating at least one signal path-ray  
2        in a spread spectrum system, comprising the steps of:  
3                receiving a spread spectrum signal; and  
4                determining a location of said spread spectrum  
5        signal using, at least partly, a decimated version of said  
6        spread spectrum signal.

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